

REMARKS:

The Information Disclosure Statement filed May 15, 2001 was said to be missing from the file, and a second copy was required for the Examiner to consider. However, it was a Preliminary Amendment, not an Information Disclosure Statement, that was filed on May 15, 2001. An Information Disclosure Statement was not filed until June 11, 2001, and the Forms PTO-1449 included in the Office action are identical to those filed on June 11, 2001 and in a Supplemental Information Disclosure Statement filed June 20, 2003. Accordingly, the undersigned assumes the missing document from the Office file is the Preliminary Amendment. A copy of this document is enclosed. It amends the specification to explicitly claim priority under 35 USC 120 based upon two prior applications which had been identified only as "related" applications in the original specification. No amendments to the claims were made.

Claims 1-37, 43-50 and 52-57 were rejected under 35 USC 102(b) as anticipated by Patent No. 5,431,806 to Suzuki et al., while claims 51 and 58 were rejected under 35 USC 103(a) over the same reference. Applicant appreciates the allowance of claims 38-42.

As illustrated in its drawings, Suzuki et al. discloses an overall oxygen electrode A (column 8, lines 45-46) consisting of a flat electrode substrate B composed of a glass (column 8, line 63), with a container substrate C (column 8, line 66) bonded to the upper surface of flat electrode substrate B, as best illustrated in Fig. 2(A). "The oxygen electrode A of the present invention is fabricated by bonding the electrode substrate B and the container substrate C together ..." (column 9, lines 10-14). A gas permeable film 27 is formed on the upper surface of the container substrate C, and an electrolyte 26-filled dent 25a in the container substrate C (column 8, line 67-column 9, line 4). The flat electrode substrate B can include a film of a Pyrex glass-containing borosilicate glass formed on the surface thereof (column 6, lines 42-52), although this film is apparently not shown in the drawings.

An example of how the electrode substrate B is bonded with the container substrate C is described at column 11, lines 25-28: "A voltage of 1200 V is applied between the

substrates at a temperature of 250° C. to effect anodic bonding between the electrode substrate and the container substrate..." Thus, as also illustrated in the figures, bonding between the two substrates occurs only along the interface between them. The only portion of any borosilicate glass on the surface of the flat electrode substrate B which is presented to the container substrate C would be along this interface between substrates B and C; there is no borosilicate glass on substrate B lateral to substrate C. In fact, any borosilicate glass lateral to substrate C would appear to directly contradict the disclosure of Suzuki et al. As shown in Figs. 2(A) and 2(B), substrate B is in vertical registration with, and does not extend laterally beyond, substrate C .

The bonding between applicant's "body" and "oxidizable substrate" of claim 1 is quite different. The reacted borosilicate mixture (RBM) which secures the body relative to the substrate extends over and lateral to the body to form an oxide interface with the substrate lateral to the body. This is illustrated in the following figures:

-Fig. 2: One RBM layer 18 is provided between the body (chip 16) and the substrate 4, while a second RBM layer 20 overlies the body and extends over the first RBM layer lateral to the body. (Page 8, lines 25-30). "Both RBM layers 18 and 20 chemically bond with the chip 16 by forming an oxide interface 24 with the chip during reaction of the RBM. Where it extends onto the wafer surface below the limits of lower RBM layer 18, the upper RBM layer 20 also forms an oxide interface with the wafer during the reaction process to extend the RBM-wafer oxide interface 22." (Page 9, lines 8-14).

-Fig. 3: "The chip 16a is placed directly in contact with the wafer 4 and coated with a single RBM layer 26, which extends onto the wafer lateral to the chip. When reacted, the RBM lateral to the chip forms a thin oxide interface 28 with the wafer, but no oxide is formed with the chip. In this case the chip is entrapped by the RBM, which securely holds it to the wafer via the RBM/wafer oxide interface 28, and protects it from the environment." (Column 10, lines 13-20, emphasis added).

-Fig. 4: This embodiment is similar to Fig. 3, but the RBM terminates short of the center of the chip, leaving a portion of the chip surface 32 exposed to the environment. (Page 11, lines 1-10). "The RBM forms a retaining oxide in-

terface 34 with the substrate when it is reacted..." (page 11, lines 10-11). As with Fig.3, the bond formed by the RBM with the substrate (wafer) to secure the body (chip) to the substrate is entirely lateral to the body.

-Fig. 5: Lead wires 36 "are spaced from each other and fully encapsulated in an RBM 38, which forms an oxide interface 40 with the underlying substrate 4 when the RBM is reacted. The RBM both spaces and insulates the lead wires from each other, while securely retaining them relative to the substrate." (Page 11, lines 20-24). The RBM extends to the substrate 4 both lateral to the lead wires 36, and under the wires.

-Fig. 6: This is similar to Fig. 5, but with a multi-layer bundle of lead wires rather than the single layer of Fig. 5. "All of the lead wires are spaced from each other and securely retained in place with respect to the substrate by a mass of RBM 50 that encapsulates at least a portion of the length of each lead wire, and is secured to the substrate 4 by an oxide interface 52 formed with the substrate during reaction of the RBM." (Page 12, lines 16-21).

Thus, while the container substrate C of Suzuki et al. is secured to the underlined flat electrode substrate B by a Pyrex glass-containing borosilicate located only at the interface between the two substrates, applicant's body is secured to his substrate by an RBM that extends over and lateral to the body in the embodiment of claim 1, with an oxide interface between the RBM and substrate lateral to the body. The body can be secured to the substrate by an RBM that extends over the substrate only lateral to the body, as in Figs. 3 and 4, or also extends under the body as in Figs. 2, 5 and 6.

In all of these embodiments, except Fig. 4, the RBM completely covers the body. This is not only inconsistent with, but actually contradicts the structure shown in Suzuki et al., in which a gas permeable film 27 is formed on the top face of the dent 25a and container substrate C (Figs. 2(A) and 2(B), column 9, lines 3-4). In addition to securing the body to the substrate, applicant's RBM can also be used to prevent gas passing to the body. For example, as stated at page 10, lines 1-5: "While the RBM oxidizes a small portion of the chip 16, it effectively encapsulates the chip and protects it from more extensive oxidation that it would otherwise suffer in an oxidizing environment at elevated temperatures." Thus, the gas permeable

film 27 of Suzuki et al. teaches a way from applicant's RBM overlying the body which is secured to the substrate.

Claim 1 has been amended to describe the RBM as "extending over and lateral to said body", and securing the body relative to the substrate "at least partially by an oxide interface with the substrate lateral to said body". (The phrase "at least partially" allows for RBM to also extend under the body, as in Fig. 2.) Of the claims that depend directly or indirectly from claim 1, claim 2 has been amended to recite the RBM as "also" extending between the body and the substrate, claims 12 and 16 have been amended to recite their respective lead wire RBMs as being "overlying", claim 14 has been amended to require that its lead wire RBM extend "lateral to each of said lead wires" as well as between the lead wires and the substrate, and claim 15 has been amended to require an "overlying" RBM for its additional sensors.

Independent claim 20, which deals with lead wires secured to a substrate, has been amended to describe the RBM as "extending over and lateral to each of said lead wires". Non-substantive semantic amendments have been made to its dependent claims 21 and 22.

Claim 31 has been amended to recite the RBM as extending over at least a portion of the substrate "lateral" to the sensor which it secures to the substrate to make the language more consistent with the specification, while dependent claim 32 has been amended in a manner similar to claim 2, and dependent claims 35 and 36 have been amended in a manner similar to claims 12 and 16.

Method claim 43 has been amended to require coating at least "an overlying" portion of the body and at least a portion of the substrate "lateral" to the body with a borosilicate mixture prior to reaction, and to delete the requirement that the borosilicate mixture be reacted "at an elevated temperature" as an unnecessary limitation.

Dependent method claim 44 has been amended to require that the substrate be "not oxidized when said body is placed on it". This is supported by the specification, which describes the oxide interface between the borosilicate mixture and substrate as being formed during the reaction process, which takes place after the body has been


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placed on the substrate (page 5, lines 13-17). In Suzuki et al., the flat electrode substrate B is already oxidized (a glass) before the bonding process begins. Dependent claim 45 has been amended to require that at least "an overlying" portion of the lead wires "and a portion of said substrate lateral to said lead wires" be coated with the borosilicate mixture.

Apparatus claim 52 and its corresponding method claim 55 relate to the encapsulation of an oxidizable body with RBM to protect it from reaction with an oxidizing atmosphere. Such encapsulation is illustrated in Figs. 2, 5 and 6 of the present application, and as described above is mutually exclusive with the gas permeable film 27 of Suzuki et al. Claim 52 has accordingly not been amended, while claim 55 has been amended similar to claim 43 to eliminate the unnecessary limitation of reacting the borosilicate mixture "at an elevated temperature".

All of the claims not already allowed are believed to be in proper form for allowance, and a Notice of Allowance is respectfully requested.

Respectfully submitted,


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